Inventory of Statewide Public Safety Communications Systems Phase I Report

A report prepared by the State Interoperability Executive Committee

July 30, 2004

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A Message from the Chair

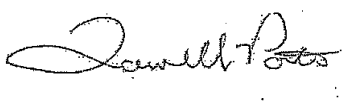
When the legislation establishing the Statewide Interoperability Executive Committee (SIEC) was passed in 2003, it set out four very aggressive deadlines for key deliverables. At the time, it was recognized that meeting the statewide inventory deadline of July 31, 2004 would be difficult due to the large number of public safety organizations involved, the challenges of reaching the right people in these organizations, and the requirement to gather comparable data from these diverse local jurisdictions.

Because of these challenges, along with an opportunity to secure federal funding to assist the SIEC in developing a comprehensive inventory, the inventory submitted today focuses solely on a limited sample of local governments within Washington state. It is the first phase of what will be a comprehensive inventory of state agency and local government emergency communications systems.

The information contained within this inventory represents about two percent of the more than 1,400 entities within the state's public safety and emergency response communities. As such, it does not offer key findings. However, we will continue seeking information and support from public safety representatives of federal, state, local and tribal governments, and the statewide inventory will identify key findings from that comprehensive survey.

On behalf of all the members of the State Interoperability Executive Committee, thank you for your interest and ongoing support of this complex issue of emergency communications interoperability.

Sincerely,



Lowell Porter
Chair, State Interoperability Executive Committee

Table of Contents

Background

On April 16, 2003, Governor Gary Locke signed Substitute House Bill 1271 into law, which established a State Interoperability Executive Committee (SIEC). The SIEC is responsible for ensuring interoperability through the proper management and coordination of the state's investments in radio communications and licensed spectrum.

Major responsibilities of the SIEC include:

- Develop and recommend technical standards for state wireless radio communication systems to the Information Services Board (ISB)
- Coordinate and manage on behalf of the ISB the licensing and use of state-designated and state-licensed radio frequencies
- Seek support including possible federal funding, or other funding, for state and local government wireless communications
- Develop recommendations for legislation that will promote interoperability
- Develop recommendations for legislation that may be required to promote interoperability of state wireless communications systems
- Foster cooperation and coordination among public safety and emergency response organizations
- Work with wireless communications groups and associations to promote interoperability among public safety and emergency response organizations

In addition, the SIEC was tasked with developing the following reports:

- An inventory of state government-operated public safety communications systems by December 31, 2003; **COMPLETED**
- An interim statewide public safety communications plan by March 31, 2004; **COMPLETED**
- An inventory of all public safety communications systems in the state by July 31, 2004; and,
- A final statewide public safety communications plan by December 31, 2004.

This report is part of the third deliverable listed above, and offers information gathered from a recently completed survey of selected local government-operated public safety communications systems. Surveyed entities represent two percent[1] of the state's public safety agencies, and about 55 percent[2] of the state's

[1] Percentage is based upon information provided to the SIEC by representatives of public safety and initial responder organizations and agencies.
[2] Based upon data taken from the Office of Financial Management Web site.

population in nine counties across the state. A more comprehensive inventory will be developed and delivered to the Legislature.

Survey Summary

The survey includes 27 local agencies in nine of the state's 39 counties. Three systems, the King County Regional Communications Systems, SNOPAC 911and the Snohomish County Emergency Radio System (SERS), operate 73 percent of those assets surveyed. More information will be gathered from other local jurisdictions to provide a comprehensive and clear picture of emergency communications in the state.

Survey respondents report 55,571 devices in use, including pagers, cell phones, mobile radios, portable radios and base stations. As shown in this report, a very low number of radios are Project 25 (P25) or are currently capable of meeting Project 25 interoperability standards.

Excluding communications systems infrastructure, the local systems surveyed reported the following public safety communications assets:

- 17,164 portable radios
- 10,293 mobile radios
- 1231 base stations / repeater radios
- 14,726 cellular phones
- 12,157 pagers

Inventory Methodology

The Survey Tool

To meet the first deliverable, the SIEC designed a questionnaire to identify state public safety agency communication assets. Information was collected, and an inventory of state assets was completed and delivered to the Legislature by December 31, 2003.

The state agency survey was modified to help gather information for the local government inventory. It was distributed to local public safety agencies based on population size of the areas served by the respective agencies or regional communication systems. These providers represent 55 percent of the State's population and provide support to general law enforcement authority, but about

two percent of the more than 1,400 public safety organizations from across the state.

The following local agencies responded to the survey:

- Clark Regional Emergency Services Agency (CRESA)
- Cowlitz County 911
- King County Regional Communications Systems (including King County Radio Communications, EPSCA, Valley Communications, and the City of Seattle)
- Kittitas County 911 (KITTCOM)
- Pacific County
- Port Angeles Fire Department
- Sequim Police Department
- Snohomish County (including Snohomish County Emergency Radio System (SERS) and SNOPAC 911)
- City of Tacoma, Public Safety Radio Communications
- Yakima County Public Safety Communications System (representing 14 towns and cities)

Communication Assets

The preliminary survey focused on six major areas of public safety communications assets:

- Radio equipment
- Infrastructure
- Cellular and pager technology
- Specialized interoperability equipment
- Radio frequency bands
- Command and control protocols

Although communications assets were the primary targets of the survey, other factors also affect the interoperability of a communications system. For this reason, agencies were also asked to provide information on the frequencies they use and if they were using a generally accepted incident response protocol.

Detailed information regarding each of these areas is provided in the sections that follow.

Radio Equipment

Overview

The local public safety agencies surveyed were asked a series of questions to determine the types of technology and quantities of radios they were using. Radio equipment can be differentiated by size and function.

Types of Radio Equipment

- Portable
- Mobile
- Base stations / repeaters

Portable radios are those that can be carried by a person. They are typically small, lightweight and have limited range for transmission.

Mobile radios may be mounted in a car or truck. These radios have a greater range than portable radios.

Base stations/repeaters are usually mounted at a fixed location (communication center) and have the greatest transmission range. Base station radios may also be configured as repeaters. Repeaters typically "hear" a radio signal and re-broadcast that signal.

Radio Equipment Technology

Each of the radios above can use one of three types of primary technology to communicate with other devices.

- Analog
- Digital
- P25

Analog radios / technologies are typically older radios used by public safety agencies in the United States. The analog signal uses waveform transmissions – rather than zeros and ones – which digital systems use. The advantage of analog systems is that in fringe reception areas, some transmission is actually heard, although the transmission may be mostly static. The disadvantage of analog technology is that systems are more prone to interference, static and eavesdropping than the newer digital technologies. Analog systems are still being deployed in many parts of the world where the advanced technology (and higher cost) of digital systems are not required.

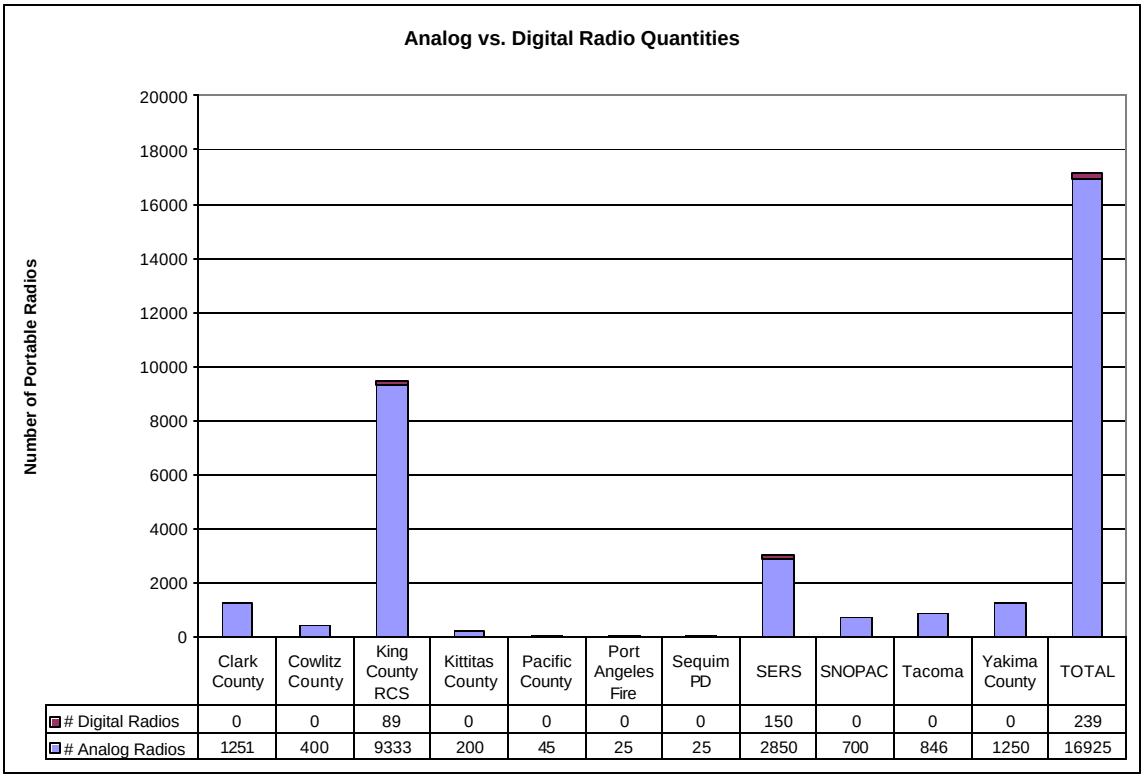
Digital radios/technology are a newer form of wireless communications that take voice transmissions and convert them to digital output (zeros and ones) and then reconstruct them into the original voice format when the signal is received. This technology is more secure than analog technology and is also less subject to static or fading signals.

P25 radios/technology are a set of standards that enable radio vendors to build radios to specifications, which within a given frequency allow all agencies to communicate with each other without regard to manufacturer, on a common P25 repeater system infrastructure from any one P25 radio vendor. P25 is a set of standards preferred by SAFECOM[3] and many federal agencies.

Inventory Information

Portable Radio Equipment

Figure 1 shows the total number of **portable** radios currently in use by the survey sample and, of those, how many are analog and digital.



	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# Digital Radios	0	0	89	0	0	0	0	150	0	0	0	239
# Analog Radios	1251	400	9333	200	45	25	25	2850	700	846	1250	16925

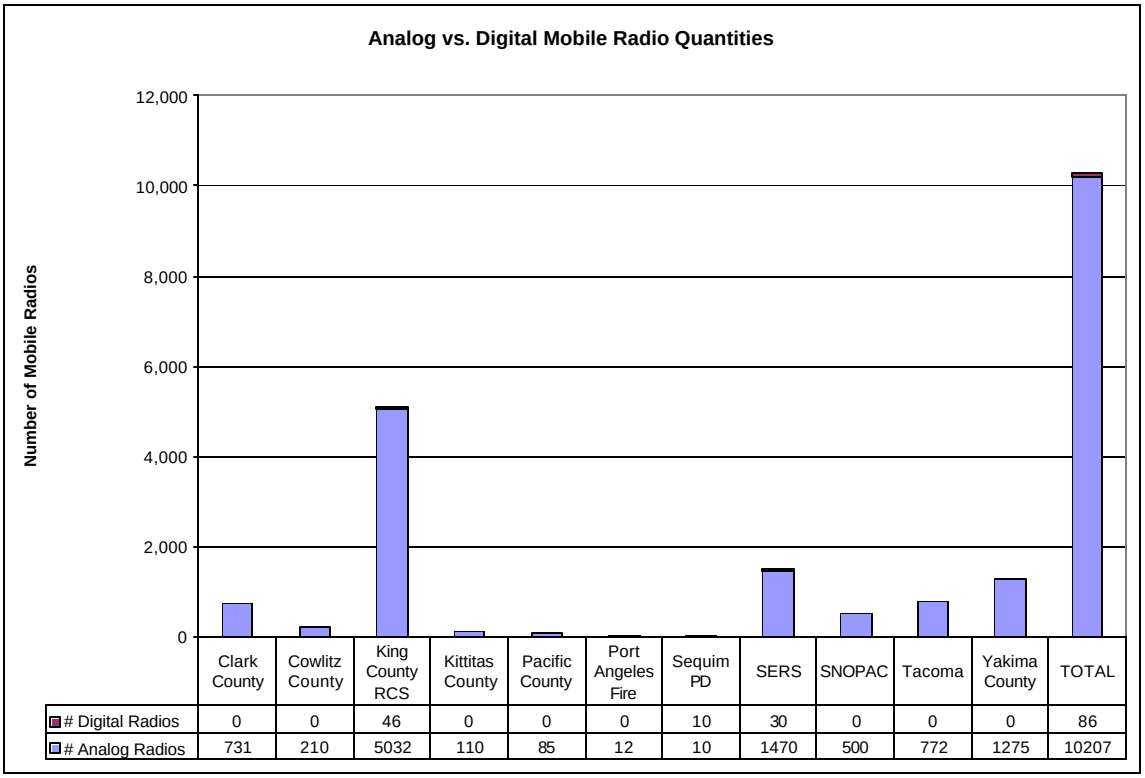
Figure 1

[3] SAFECOM was established to serve as the umbrella program within the Federal government to help local, tribal, state and federal public safety agencies improve public safety response through more effective and efficient interoperable wireless communications. For additional information on SAFECOM, visit their Web site at http://www.whitehouse.gov/omb/egov/gtog/safecom.htm.

Snohomish County's systems are shown separately as SNOPAC and SERS because they are two distinct and separate radio systems operating in different frequency bands.

Mobile Radio Equipment

Figure 2 shows the total number of **mobile** radios currently in use by the survey sample, and of those, how many are analog and digital.

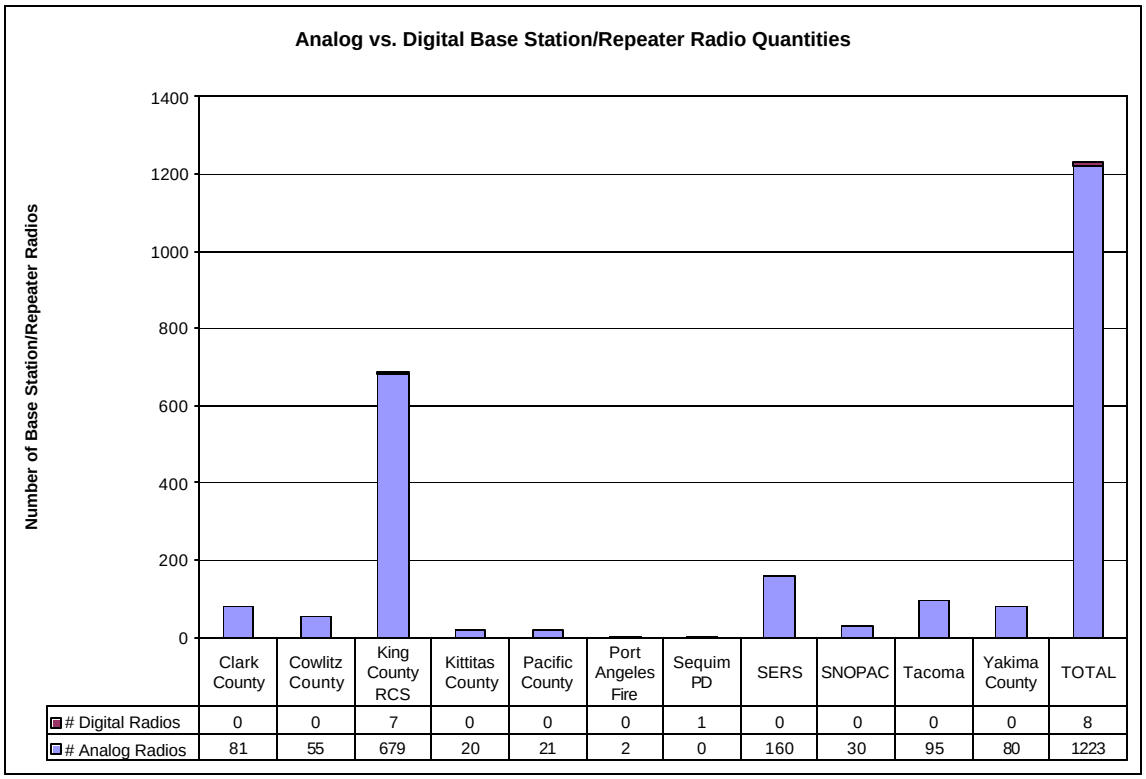


	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# Digital Radios	0	0	46	0	0	0	10	30	0	0	0	86
# Analog Radios	731	210	5032	110	85	12	10	1470	500	772	1275	10207

Figure 2

Base Stations/Repeaters

Figure 3 represents the total number of **base station** radios that are being used in the sample survey of local agencies in Washington state. Survey results show that 99 percent of the local agency mobile radios are analog and the remaining one percent are digital.



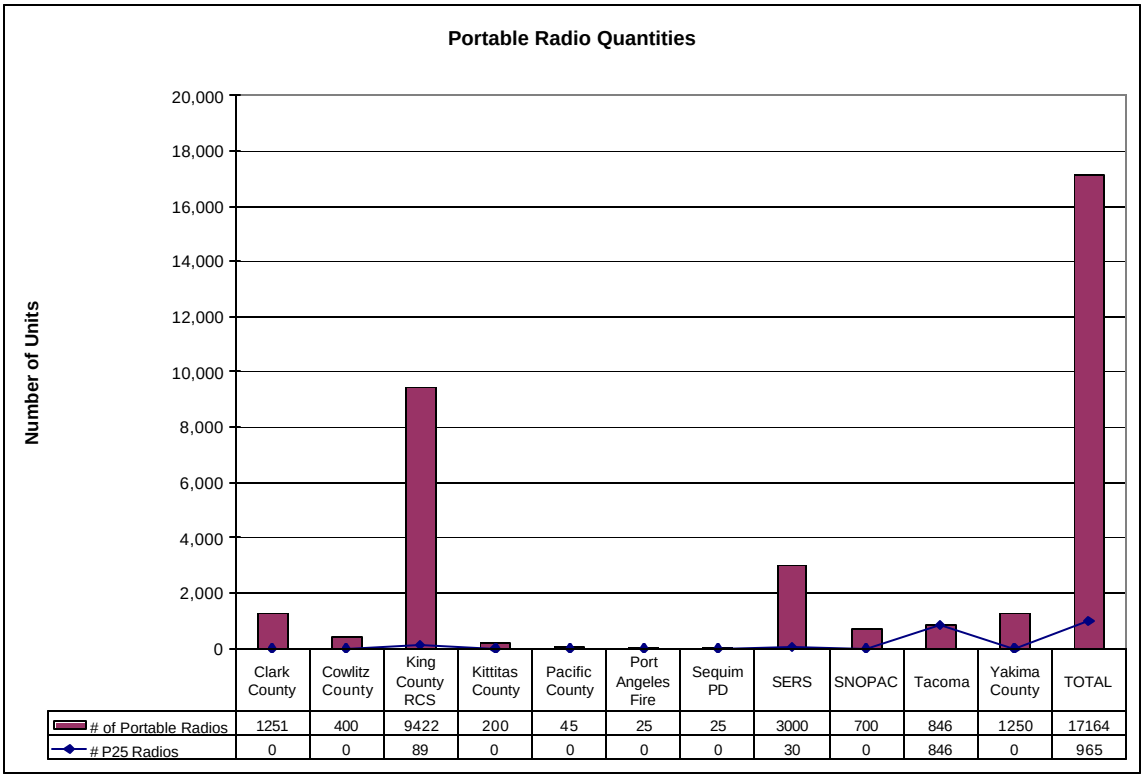
	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# Digital Radios	0	0	7	0	0	0	1	0	0	0	0	8
# Analog Radios	81	55	679	20	21	2	0	160	30	95	80	1223

Figure 3

The vast majority of local assets inventories are analog. As indicated earlier in this report, analog technology is older technology and was used by most agencies many years ago. The systems inventoried that use, or are capable of using digital technology, are generally newer and more robust.

Project 25-Based Equipment

As highlighted in Figures 4, 5, and 6, survey respondents show a low percentage of current equipment that is P25-compliant. A major consideration of P25 deployment is high equipment cost. Equipment costs for P25 radios are becoming lower due to competition among vendors and consolidated purchase contracts between user groups.



	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# of Portable Radios	1251	400	9422	200	45	25	25	3000	700	846	1250	17164
# P25 Radios	0	0	89	0	0	0	0	30	0	846	0	965

Figure 4

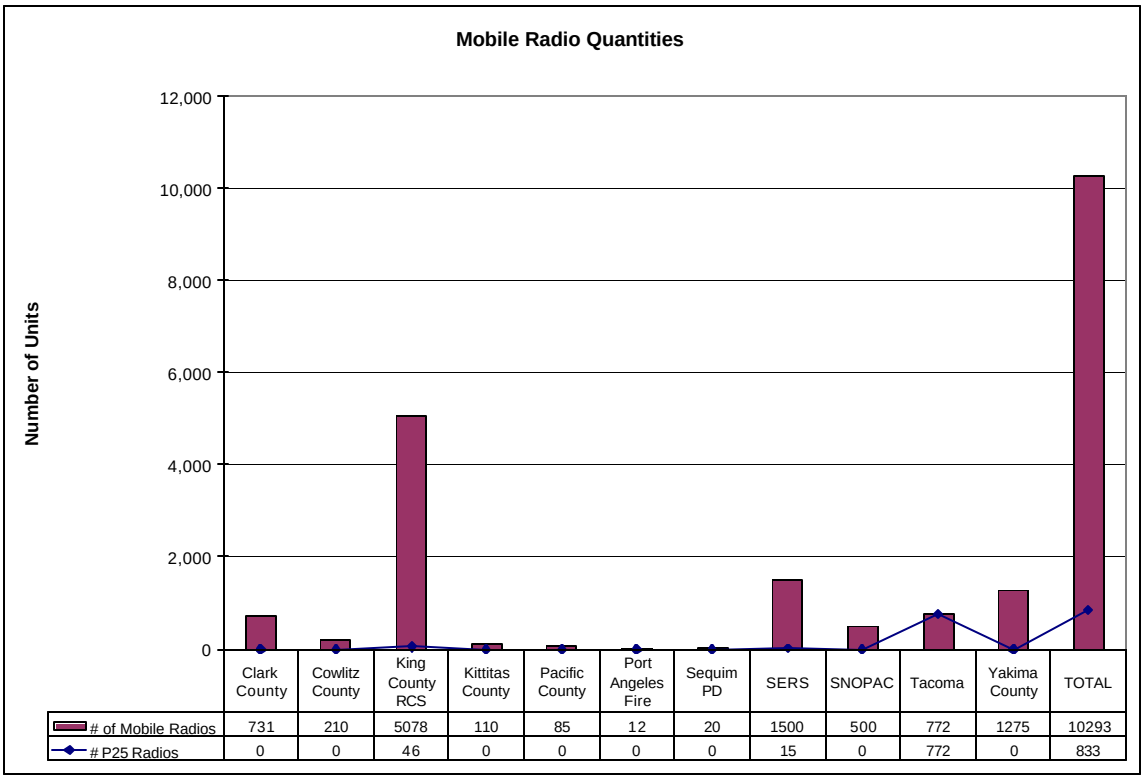


Figure 5

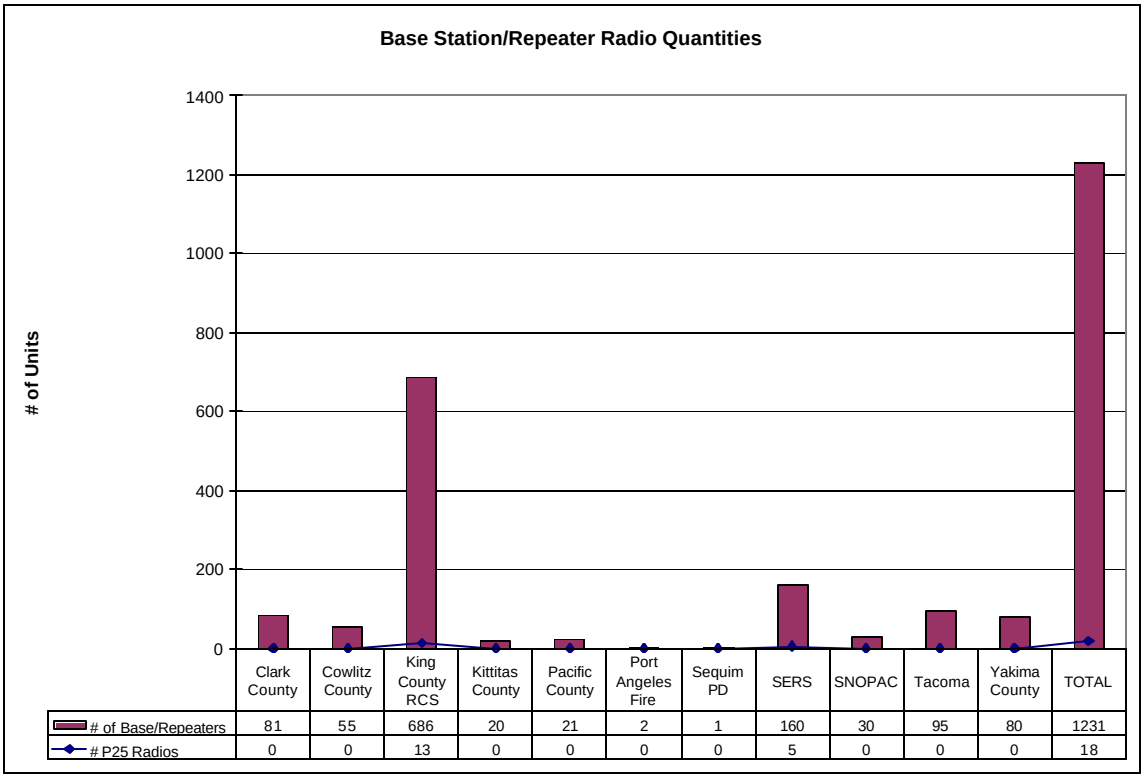
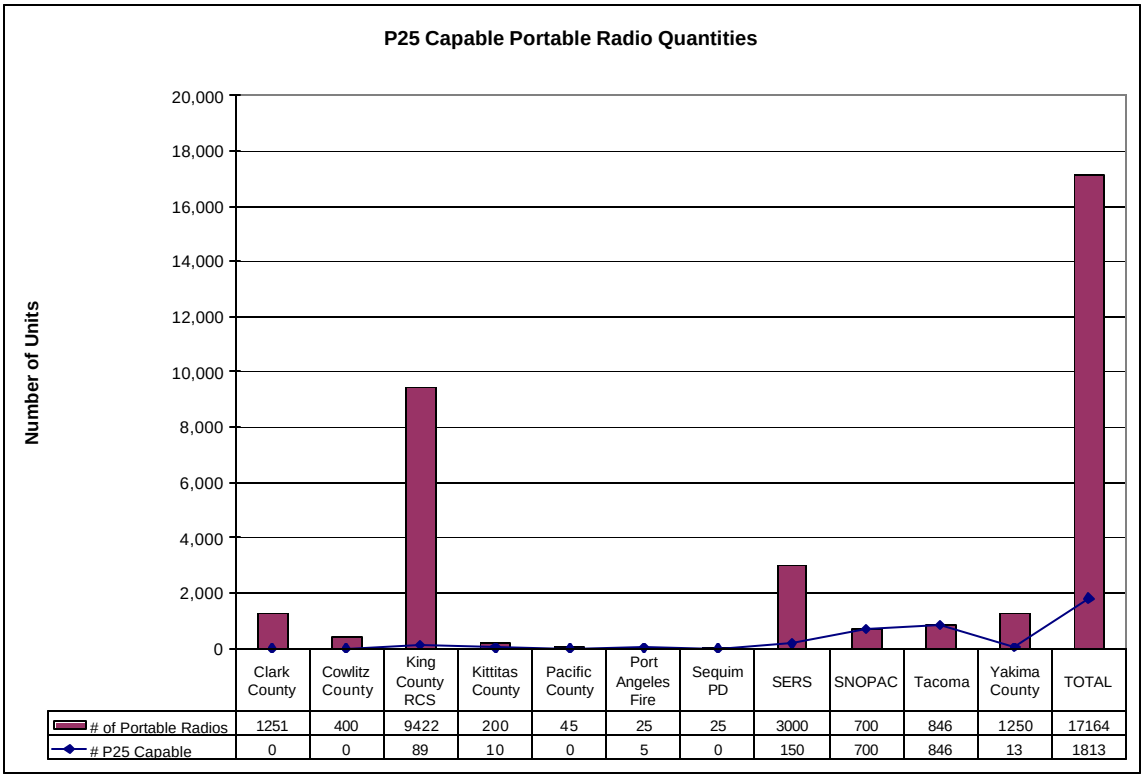


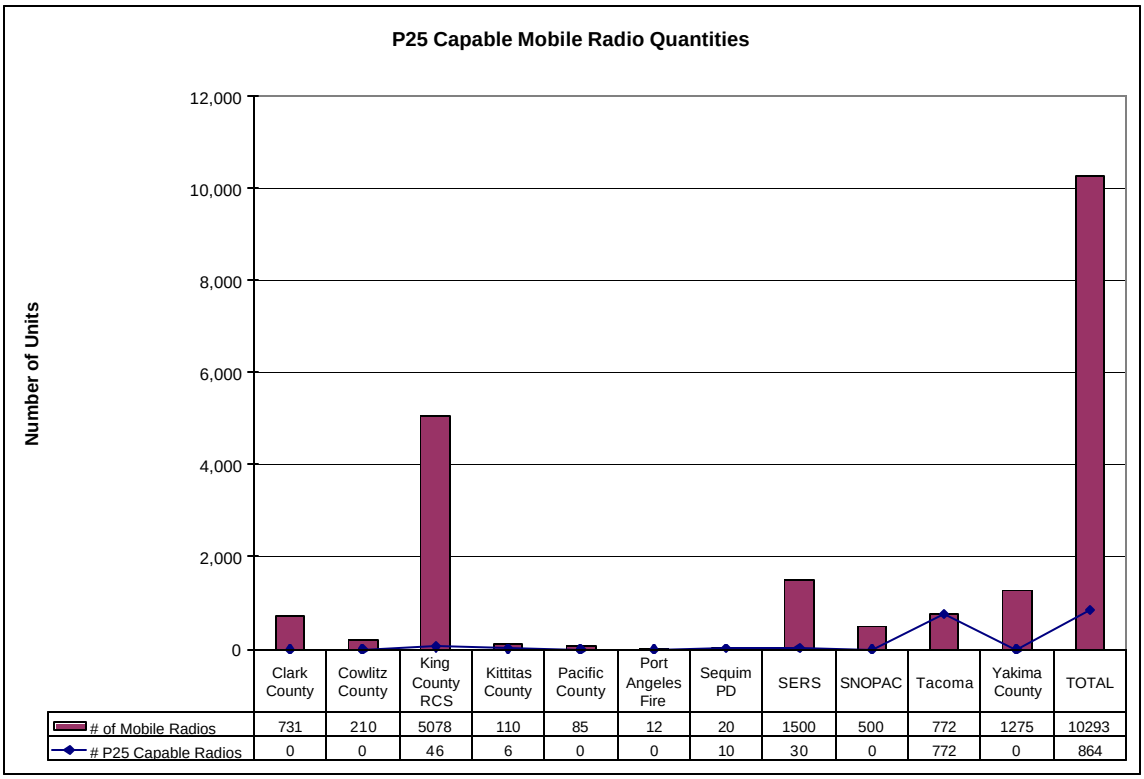
Figure 6

Seven percent of the assets owned by the agencies responding possess equipment capable of being upgraded to the P25 standard *(Figures 7-9)*. Implementation of a P25 requirement or standard that required replacement of non-P25 capable equipment would result in significant costs to those agencies surveyed.



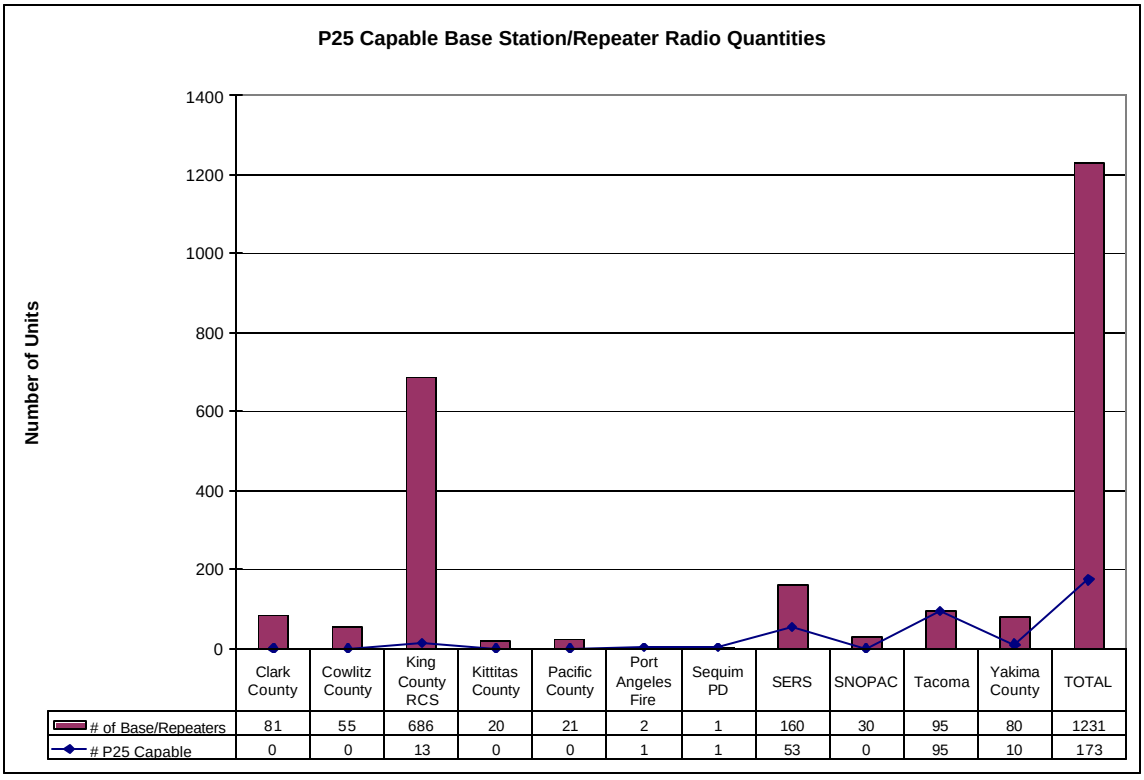
	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# of Portable Radios	1251	400	9422	200	45	25	25	3000	700	846	1250	17164
# P25 Capable	0	0	89	10	0	5	0	150	700	846	13	1813

Figure 7



	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# of Mobile Radios	731	210	5078	110	85	12	20	1500	500	772	1275	10293
# P25 Capable Radios	0	0	46	6	0	0	10	30	0	772	0	864

Figure 8



	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# of Base/Repeaters	81	55	686	20	21	2	1	160	30	95	80	1231
# P25 Capable	0	0	13	0	0	1	1	53	0	95	10	173

Figure 9

The P25 standard is intended to promote interoperability through the use of "open" technology standards. However, P25 will not solve the issue of state and local agencies located in multiple frequency bands. P25 is not a complete solution, but one of many tools used to resolve interoperability issues.

Infrastructure

Overview

The purpose of radios is to initiate and receive transmissions. "Infrastructure" refers to the equipment, physical facilities, networks or other communications components required to move or transmit information between end points.

Radios typically work using relatively low power to transmit over limited areas. The distance that a radio wave can travel is determined by the power generated by the radio itself, the frequency of the radio wave and the terrain over which the radio wave must travel. Terrain plays a large role in how far a signal can be detected, as radio waves travel in straight lines, often times called "line of sight."

To ensure that the relatively weak signal emitted by a radio device can be propagated over long distances, microwave towers must be located at geographically strategic locations. Microwave towers use a high-frequency electromagnetic wave to transmit information. These towers receive signals that are broadcast by radios or other towers, amplify the signal and then pass it along, either to another tower or to a radio.

Additionally, other "wired" assets, such as dedicated high capacity communication circuits, can be used as a medium to reliably move radio communications from the source to its intended destination.

Major Infrastructure Components

The survey gathered information regarding four major infrastructure components:

- Analog microwave towers
- Digital microwave towers
- Dedicated or "leased" lines
- Optical fiber

Analog microwave towers/equipment send multiple voice channels over a single microwave frequency beam. Analog technology has been used by public safety agencies since the 1950s.

Digital microwave towers/equipment use digital technologies to transmit information using bits and bytes over a single beam. Digital technologies allow the transmission of multiple formats, such as voice, video and data simultaneously.

A **leased line** is a communication circuit that has been leased from a telecommunications company or other source for private use.

Optical fiber refers to the transmission of information as light impulses along a glass fiber. Optical fiber can carry significantly more information at faster rates than conventional copper wire and is not subject to electromagnetic interference.

Infrastructure by Location

The table below provides a view of major infrastructure components by responding counties, which illustrates where equipment is either located or being used, and which agency or agencies have primary control or ownership of each component.

County	Fiber	Analog Microwave Towers	Digital Microwave Towers	Leased Lines
Clallam	Sequim PD			Sequim PD
Clark		CRESA		
Cowlitz			Cowlitz County 911	Cowlitz County 911
Island			SERS	SERS
King	King County RCS	King County RCS	King County RCS	King County RCS
Kitsap			SERS	
Kittitas	KITTCOM		KITTCOM	KITTCOM
Pacific	Pacific County		Pacific County	
Pierce	Tacoma	Tacoma	Tacoma	Tacoma
Skagit			SERS	
Snohomish		SERS, SNOPAC	SERS	SERS, SNOPAC
Yakima	Yakima County	Yakima County	Yakima County	Yakima County

Table 1

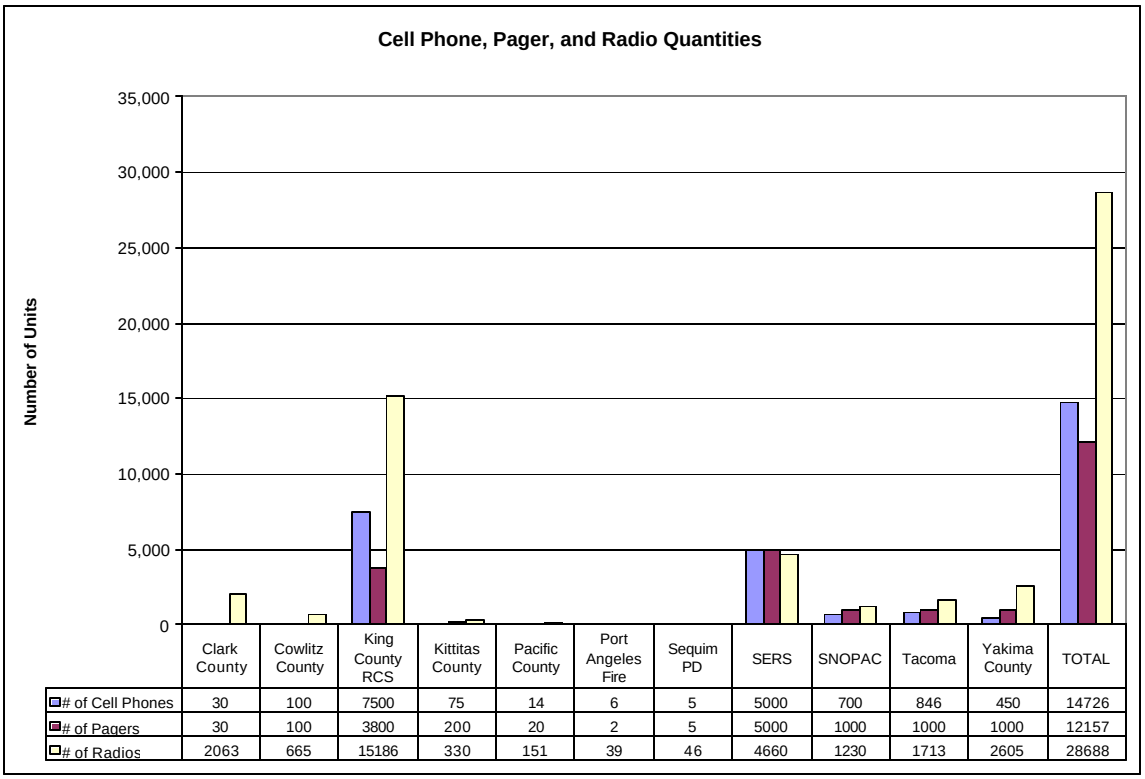
As Table 1 shows, local agencies responding to the survey use a variety of different infrastructure technologies to support their communication systems. The infrastructure may support a regional system with multiple agencies or a single agency's communication system. Given the limited nature of this preliminary survey, enough data does not exist to draw conclusions or make recommendations regarding locally-owned and/or -operated infrastructure.

For example, even though these tower facilities may be owned and maintained by a single agency, many of these facilities are actually used by multiple agencies under a joint operating agreement to leverage land, power and facility costs. This information, however, is not depicted in the table or available through the preliminary survey.

Cellular and Pager Technology

Local government organizations and agencies responding to the survey depend on commercial cellular and pager technology as identified below (*Figure 10).*

A concern expressed repeatedly by public safety organizations nationwide is the unpredictability of commercial cellular service during times of emergency. Public safety organizations must be able to communicate in situations ranging from routine daily operations to natural disasters, and to acts of terrorism. Commercial service providers often fail to balance the needs of commercial customers with the communication requirements of public safety organizations. Survey results show that some agencies have a high percentage of cell phones compared to radios. These respondents may have to rely on other communication systems in times of emergency.



	Clark County	Cowlitz County	King County RCS	Kittitas County	Pacific County	Port Angeles Fire	Sequim PD	SERS	SNOPAC	Tacoma	Yakima County	TOTAL
# of Cell Phones	30	100	7500	75	14	6	5	5000	700	846	450	14726
# of Pagers	30	100	3800	200	20	2	5	5000	1000	1000	1000	12157
# of Radios	2063	665	15186	330	151	39	46	4660	1230	1713	2605	28688

Figure 10

Interoperability Equipment

Overview

In addition to asking respondents to provide information regarding the current state of their radio systems, agencies were also asked to identify specialized interoperability assets. Responses indicate that some agencies currently have special interoperability equipment. This equipment is as follows:

- Satellite phones
- ACU-1000 communication switches
- Transpeaters

Satellite phones are used by many state and local agencies to communicate with others in the event that existing radio infrastructure is no longer operational. Satellite phones can also be used in place of cellular technology or the public switched network.

The **ACU-1000** is a communication switch that may be mobile or stationary and can be used to connect several disparate radio systems. The ACU-1000 is a robust cross-connection platform that allows for *ad hoc* radio "patching." The ACU-1000 is recognized by the U.S. Department of Justice as one of the best solutions to create temporary interoperability. These systems use radio/frequency and can be quickly set up when necessary.

Transpeaters may be used as either mobile or stationary cross-band repeaters. By connecting two conventional radios to a transpeater system, the normal range of radios is substantially extended. Also, these devices enable individuals using different frequencies to communicate with each other as necessary.

It is important to understand that although some existing equipment can be used to create *ad hoc* networks, most specialized interoperability units must be driven to or dropped into place at the scene, thereby consuming valuable response time. As a result, it is important to conduct thorough pre-planning to determine strategic placement of this equipment so that it can be mobilized and deployed with minimal delay.

For a summary of this information, review Appendix E.

State Radio Frequencies

There are 10 frequency bands available for nationwide public safety use. The local agencies surveyed use six frequency bands to communicate daily and across organizational/jurisdictional boundaries.

Overall, the vast majority of the local government radio assets inventoried use the 800 and 150 MHz bands. Approximately 78 percent of radio assets operate at 800 MHz, 19 percent at 150 MHz, and the remaining 3 percent operating in the 450-470 MHz range and 25-50 MHz range. Of the responding agencies that currently use the 800 MHz band, the King County Regional Communications Systems accounts for 49 percent of the radio assets in this grouping (see *Table 2* below). It is noteworthy that the state inventory also showed the majority of its radios operate in the 800 MHz band. Due to the limited nature of this survey, and the results of the state survey, it is clear this topic requires additional exploration.

AGENCY	*Frequency (MHz)*	*% of Local Radios Assets Surveyed*
King County Regional Communications Systems	25-50, 148-174, 450-470, 806-824, 851-869	53%
Cowlitz County 911	148-174	2%
Kittitas County 911 (KITTCOM)	148-174	1%
Port Angeles Fire Dept.	148-174	<1%
SNOPAC 911	148-174	4%
Yakima County	148-174	9%
Pacific County	450-470	1%
Sequim Police Dept.	450-470	<1%
Clark County Regional Services Agency (CRESA)	851-869	7%
Snohomish County Emergency Radio System (SERS)	806-824, 851-869	16%
City of Tacoma	806-824	6%

Table 2

Command and Control

In times of crisis, a systematic and organized method of using public resources is essential. The survey asked public safety agencies if the agency currently used a command and control structure or an incident command protocol. The responses are shown in Table 3 below. The National Incident Management System, Incident Command System NIMS/ICS structure is used by respondents whose radio assets comprise 94 percent of the total assets surveyed.

Command and Control Structure or incident command protocol	CRESA	Cowlitz 911	King RCS	KITTCOM	Pacific County	SERS	SNOPAC	Tacoma	Yakima County
NIIMS/ICS	X	X	X	X		X		X	X
Form 205 template					X	X			
Self developed template	X					X			
Ad hoc				X			X		
Law Enforcement Mobilization									
Military Annex K									

Table 3

APPENDIX A

PORTABLE RADIO INVENTORY DATA

	Clark County - CRESA	Cowlitz County	King County RCS	Kittitas County – KITTCOM	Pacific County	Sequim PD / Port Angeles Fire	Snohomish County - SERS	Snohomish County – SNOPAC	Tacoma	Yakima County
Total # of portable radios	1251	400	9422	200	45	50	3000	700	846	1250
Frequency band	851-869	148-174	851-869/450-470/148-174/25-50	148-174	450-470	450-470/148-174	806-824	148-174	806-824	148-174
Percentage P-25	0	0	1	0	0	0	1	0	100	0
Percentage P-25 capable	0	0	1	5	0	10	5	0	100	1
Percentage analog	100	100	99	100	100	100	95	100	100	100
# of analog radios	1251	400	9333	200	45	50	2850	700	846	1250
# of digital radios	0	0	89	0	0	0	150	0	0	0
Percentage trunked	100	0	94	0	0	0	100	0	0	2
Percentage conventional	100	100	6	100	100	100	15	100	0	98

APPENDIX B

MOBILE RADIO INVENTORY DATA

	Clark County - CRESA	Cowlitz County	King County RCS	Kittitas County – KITTCOM	Pacific County	Sequim PD / Port Angeles Fire	Snohomish County - SERS	Snohomish County – SNOPAC	Tacoma	Yakima County
Total # of mobile radios	731	210	5078	110	85	32	3000	1012	772	1275
Frequency band	851-869	148-174	851-869/450-470/148-174/25-50	148-174	450-470	450-470/148-174	806-824	148-174	806-824	148-174
Percentage P-25	0	0	1	0	0	0	1	80	100	0
Percentage P-25 capable	0	0	1	5	0	31	2	80	100	1
Percentage analog	100	100	99	100	100	69	98	20	100	100
# of analog radios	731	210	5032	110	85	22	1470	203	772	1275
# of digital radios	0	0	46	0	0	10	30	809	772	0
Percentage trunked	100	0	90	0	0	0	95	0	100	10
Percentage conventional	100	100	10	100	100	100	15	100	100	90

APPENDIX C

BASE STATION / REPEATER RADIO INVENTORY DATA

	Clark County - CRESA	Cowlitz County	King County RCS	Kittitas County – KITTCOM	Pacific County	Sequim PD / Port Angeles Fire	Snohomish County - SERS	Snohomish County – SNOPAC	Tacoma	Yakima County
Total # of radios/repeaters	81	55	686	20	21	3	160	30	95	80
Frequency band	851-869	148-174	806-824/450-470/148-174/25-50	148-174	450-470	450-470/148-174	851-869	148-174	806-824	148-174
Percentage equipment in base station configuration	10	85	74	20	33	0	95	90	3	75
Percentage equipment in repeater configuration	90	15	26	80	67	50	5	10	97	25
Percentage P-25	0	0	2	0	0	50	3	0	100	0
Percentage P-25 capable	0	0	2	0	0	0	33	0	100	12
Percentage analog	100	100	98	100	100	100	100	100	100	100
# of analog radios/repeaters	81	55	679	20	21	3	160	30	95	80
# of digital radios/repeaters	0	0	7	0	0	0	0	0	0	0
Percentage trunked	90	0	95	0	0	0	90	0	100	6
Percentage conventional	10	100	5	100	100	100	10	100	100	74

APPENDIX D

CELLULAR AND PAGER INVENTORY DATA

	Clark County - CRESA	Cowlitz County	King County RCS	Kittitas County – KITTCOM	Pacific County	Sequim PD / Port Angeles Fire	Snohomish County - SERS	Snohomish County – SNOPAC	Tacoma	Yakima County
CELLULAR TELEPHONES										
Estimated quantity	30	100	7500	75	14	11	5000	700	846	450
PAGERS										
Estimated quantity	30	100	3800	200	20	7	5000	1000	1000	1000

APPENDIX E

INTEROPERABILITY EQUIPMENT INVENTORY DATA

	Clark	Cowlitz	King County RCS	KITTCOM	Pacific	Sequim PD / Port Angeles Fire	SERS	SNOPAC	Tacoma	Yakima
	0	0	0	0	0	0	0	0	0	0
JPS/Raytheon ACU-1000	0	0	2	0	0	0	1	0	1	0
Transpeater	0	35	2	0	1	0	4	0	0	0
Satellite phones	0	5	30	0	0	2	5	0	8	0
Conventional Repeater (transportable)	1	0	0	0	0	0	0	0	0	0
Communications Van	1	0	0	0	0	0	0	0	0	0

APPENDIX F[4]

ESTIMATED NUMBER OF DEVICES INVENTORIED

AGENCY	Portable	Mobile	Base Station/ Repeater	Cellular	Pagers	TOTAL BY AGENCY
Clark County	1251	731	81	30	30	**2,123**
Cowlitz County 911	400	210	55	100	100	**865**
King County RCS	9422	5078	686	7500	3800	**26,486**
Kittitas County -KITTCOM	200	110	20	75	200	**605**
Pacific County	45	85	21	14	20	**185**
Sequim PD / Port Angeles Fire	50	32	3	11	7	**103**
Snohomish County - SERS	3000	1500	160	5000	5000	**14,660**
Snohomish County – SNOPAC 911	700	500	30	700	1000	**2,930**
Tacoma	846	772	95	846	1000	**3,559**
	0	0	30	8	60	**98**
Yakima County	1250	1275	80	450	1000	**4,055**
Total Local Assets	**17,164**	**10,293**	**1261**	**14,734**	**12,217**	**55,669**

[4] The data in this appendix is the result of a snapshot of emergency communication systems used by a sampling of local governments within nine of Washington's 39 counties.